SOIL SURVEY OF

Alamosa Area, Colorado

Major fieldwork for this soil survey was done in the period 1962-66. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1966. This survey was made cooperatively by the Soil Conservation Service and the Colorado Agricultural Experiment Station. It is part of the technical assistance furnished to the Mosca-Hooper Soil Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C., 20250

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SOIL SURVEY OF ALAMOSA AREA, COLORADO

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION

WITH THE COLORADO AGRICULTURAL EXPERIMENT STATION

THE ALAMOSA AREA is located in a broad, high mountain valley. This is the San Luis Valley, located in the south-central part of the State (fig. 1).

The survey area is approximately 27 miles square. It contains about 678 square miles, or 434,328 acres, and is within Alamosa County, Colorado. It is nearly level and has an elevation of approximately 7,500

HOW THIS SURVEY WAS MADE

Soil scientists made this survey to learn what kinds of soil are in the Alamosa Area, where they are located, and how they can be used. The soil

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planni

GENERAL SOIL MAP

The general soil map at the back of this survey shows, in color, the soil associations in the Alamosa Area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a building or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in the Alamosa Area are discussed in the following pages.

1. Gunbarrel-Mosca-San Luis Association

Deep, Nearly Level, Well-drained to Poorly Drained, Coarse Textured to Moderately Coarse Textured Soils

This soil association consists of intensively

of greasewood, rabbitbrush, alkali sacaton, and inland saltgrass.

This association covers about 20 percent of the survey area. About 50 percent of the association is Gunbarrel soils, about 25 percent is Mosca soils, and nearly 25 percent is San Luis soils. Small areas of Arena and Hooper soils make up less than 1 percent of the association.

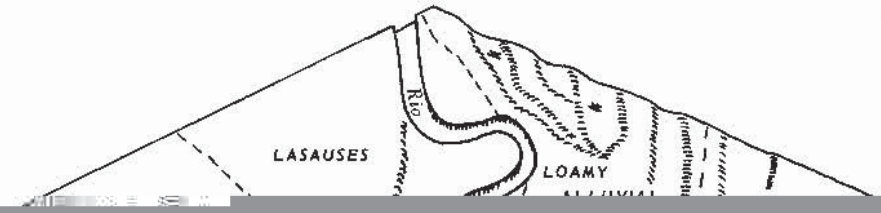
The Gunbarrel soils are the most important sub-irrigated soils in the survey area. They are deep, coarse-textured soils that have a high water table during a large part of the year. Many areas are saline.

The Mosca soils also are important to farming. These soils have a coarse-textured surface layer and a moderately coarse textured subsoil. They are underlain by sand and gravel at a depth ranging barley, oats, and alfalfa. Most farms range from 160 to 320 acres in size. Land that is not farmed is used for grazing.

3. Alamosa-Vastine-Alluvial land Association

Deep, Nearly Level, Moderately Well Drained to Poorly Drained, Moderately Fine Textured to Coarse-textured Soils

This soil association consists of the dark-colored alluvial soils on the low flood plains that border the Rio Grande River and Alamosa, LaJara, and Rock Creeks (fig. 3). The soils are nearly level or undulating, and there are many old stream channels and sloughs. A large part of this general


LASAUSES
LOAMY

This soil association consists of intensively farmed soils in the southwestern part of the survey area. It is a [redacted]

The Acacio soils are on the ridges, generally toward the edge. These soils have a medium-textured [redacted]

5. Hooper-Corlett Association

Deep, Nearly Level to Hummocky, Well-drained and Somewhat Excessively Drained, Moderately Fine Textured to Coarse-textured Soils that are Strongly

inland saltgrass. In large areas, however, there is no vegetation except for an occasional greasewood bush.

This association covers about 33 percent of the survey area. About 50 percent of the association

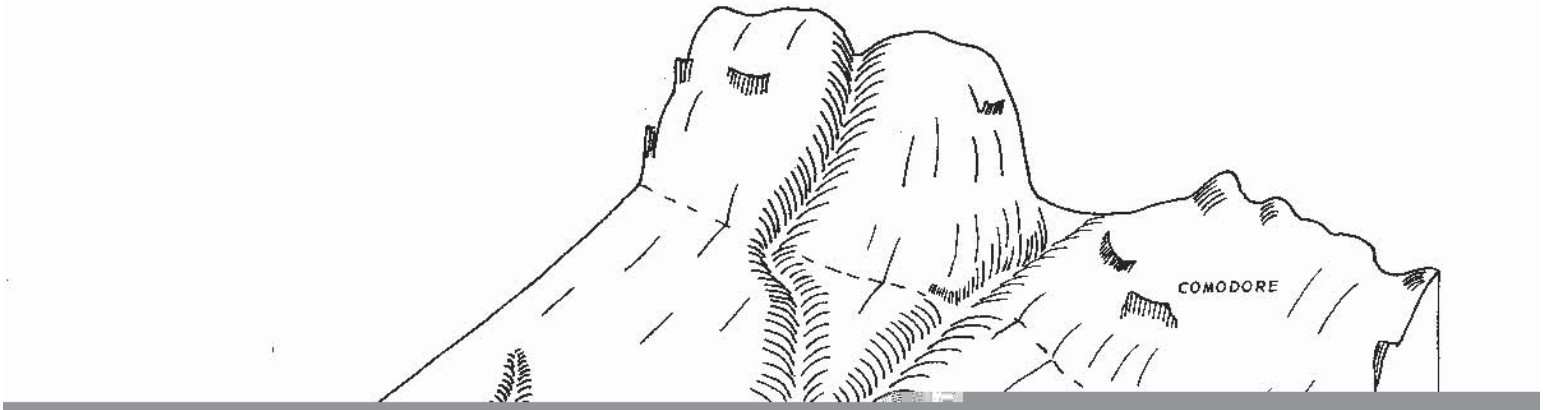
Space City and Laney soils are among the minor soils in this association. The Space City soils are mostly in the eastern part of the association and occupy some of the higher dunes and ridges. Most areas of Space City soils are in intricate patterns with Hooper soils. The Laney soils are in large areas, mostly in the eastern part of the association, and are nearly level.

A small acreage of San Luis and Hapney soils occurs in this association. The San Luis soils are mostly intermingled with Corlett soils.

The soils in this association are used mainly for grazing. Stock water is obtained from artesian wells. There are many small ponds and water areas around the artesian wells that are [illegible]

the mountainsides and sloping to moderately steep alluvial fans on the west face of the Sangre de Cristo Mountain Range. The soils here receive more rainfall than soils on the valley floor. Elevations range from about 7,700 feet to about 11,000 feet. The vegetation is mostly pinyon trees and some juniper trees. The north slopes and areas along flowing streams have fir, ponderosa pine, and spruce trees. Grasses are blue grama, Arizona fescue, mountain muhly, and needlegrass. Mountain-mahogany, Apache-plume, rabbitbrush, fringed sage, and other shrubs also occur. The lower parts of the alluvial fans have a cover of grass rather than trees.

This association covers about 5 percent of the


COMODORE

of the farms in this association range from 320 to 480 acres in size.

9. Cotopaxi-Dune land Association

vegetation is sparse in most places. Dune land is bare, and the sand shifts easily with the wind.

This association covers about 5 percent of the survey area. About 75 percent of the association is Cotopaxi soils, and about 25 percent is Dune

TABLE 1.--APPROXIMATE ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

B21t--4 to 7 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) when moist; weak to moderate, [illegible] structure parting to moderate [illegible]

10 inches, particularly in fields that have been leveled. Some small areas of Zinzer loam, 0 to 1 [illegible] of Ville Grove soils also are

Alamosa soils have moderately slow permeability and moderate to high available water holding capacity. Many areas are close to the river and are subject to overflow during periods of heavy runoff. These soils have a water table that fluctuates be-

thick. The depth to sand ranges from 40 inches to about 60 inches. The soil commonly is noncalcareous in the A horizon but may be calcareous below.

Alamosa loam (0 to 1 percent slopes) (Am).--This

In unfarmed areas the vegetation is sedges, rushes, alkali sacaton, and saltgrass. Capability unit IIIw-2 (irrigated) and VIw-1 (nonirrigated); Salt

C1--13 to 23 inches, pinkish-gray (7.5YR 6/2) clay loam, dark brown (7.5YR 4/2) when moist; weak

representative for the Arena series, except that it does not contain strong concentrations of alkali and salts. Depth to sand ranges from 40 to 60 inches. This soil is somewhat poorly drained. The water table is at a depth of 2 1/2 to 5 feet and is nearest to the surface in spring and summer. In most places drainage has been provided, which has resulted in a lower water table than is normal for the

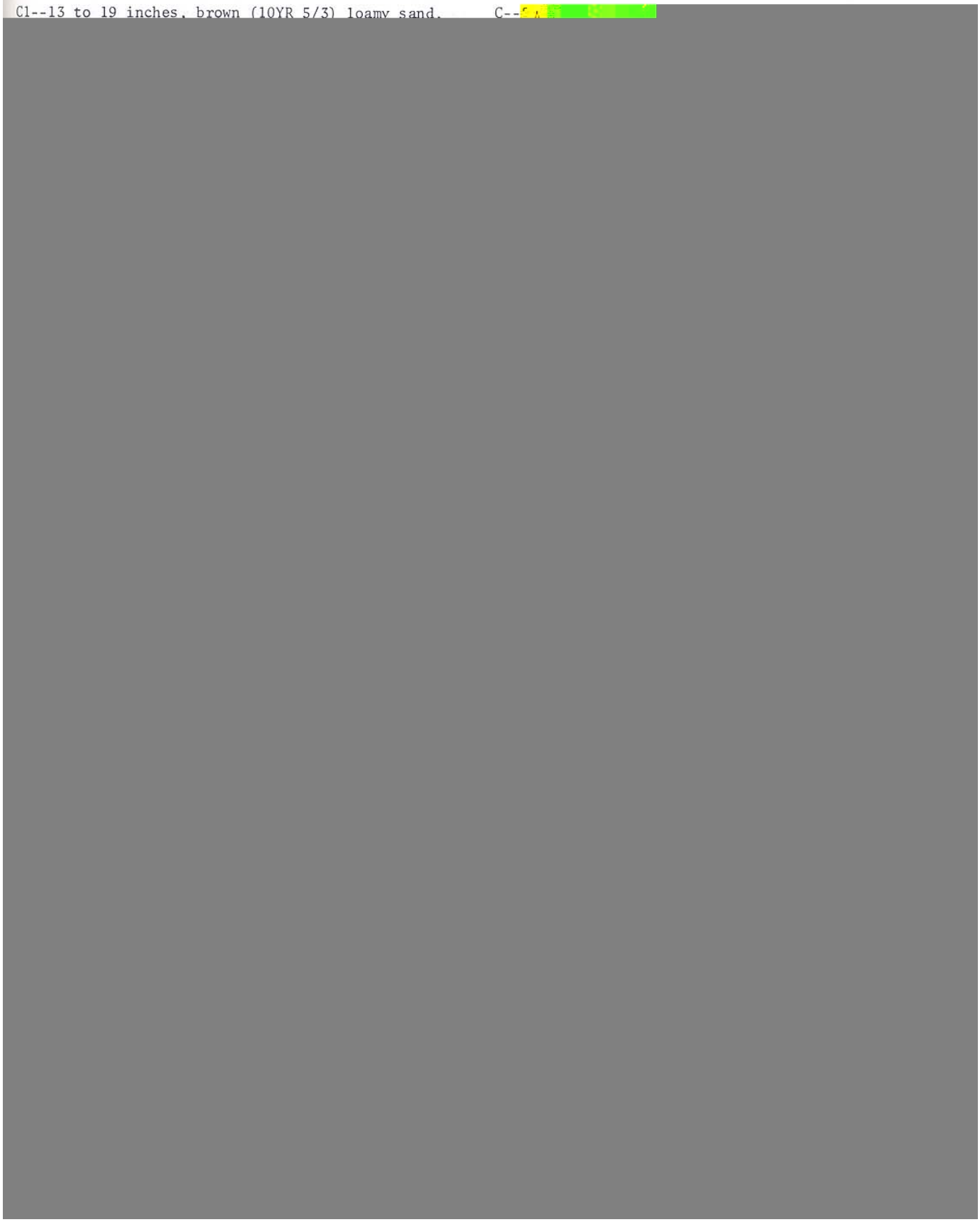
The color of the surface layer is dark grayish brown on south-facing slopes. These soils range from 4 to 16 inches in depth to bedrock. The content of stones ranges from 20 to 80 percent. The parent material ranges from granite to granitic schist, quartz, and other acid igneous or metamorphic rocks. The pH value is about 6.1 to 6.5.

A1--0 to 8 inches, light brownish-gray (10YR 6/2) sand, dark grayish brown (10YR 4/2) when moist; single grain; loose; slightly calcareous; pH 9.8; gradual, smooth boundary.

C1--8 to 24 inches, light brownish-gray (10YR 6/2)

water near the surface, and this generally is the level of the water under the entire complex. The water table commonly is several feet below the tops of dunes and near the surface in the lake basin areas. Surface runoff is slow. The hazard of soil

C1--13 to 19 inches, brown (10YR 5/3) loamy sand.



that is highly calcareous and strongly alkaline in the upper 7 inches and is noncalcareous and neutral in the lower part. This extends to a depth of 60 inches or more.

Graypoint soils have a moderately permeable subsoil and a very rapidly permeable substratum. The

this has left gravel bars exposed in many places. These gravel bars make up most of Gravelly land. In other places deep plowing leaves a gravelly sandy loam surface layer. The soils have very low available water holding capacity and are very droughty. Surface runoff is very slow. The hazard of erosion

grain; loose; strongly calcareous; pH 8.8; clear, smooth boundary.

IIC2--48 to 60 inches, varicolored coarse sand and fine gravel; noncalcareous.

The main variations are in the amount and distribution of lime in the soil and in the depth to sand and gravel. The depth to calcareous material ranges from 0 to 15 inches. Depth to sand and gravel ranges

In a representative profile, the surface layer is dark grayish-brown loam about 2 inches thick. In cultivated fields the upper layers have been mixed and the plow layer is clay loam about 8 inches thick. It is strongly calcareous and is moderately alkaline to strongly alkaline. The subsoil is very dark gray and very dark grayish-brown clay loam to a depth of 23 inches. It is slightly to moderately calcareous and strongly alkaline. The next 9 inches is dark-

The A horizon ranges from fine sandy loam to clay [illegible]

inches thick. This layer is moderately calcareous and very strongly alkaline. The upper part of the substratum is grayish-brown sandy loam, about 16 inches thick, that is moderately calcareous and very

exchangeable sodium is higher than where the horizon is sandy. Texture of the B2t horizon ranges from clay loam to clay. Depth to the underlying sand ranges from 20 to 40 inches. The content of ex-

infrequently but often enough to prevent alkali sa[redacted]

In a representative profile, the surface layer is dark grayish-brown loam, about 4 inches thick, that is highly calcareous and very strongly alkaline. Next is a layer of brown loam that is highly calcareous and very strongly alkaline. It is about 13 inches thick and is underlain by dark grayish-brown

The A horizon ranges from 3 to 6 inches in thickness and has a range in pH value of 8.6 to 9.6. The C horizon consists of stratified loam, clay loam, sandy loam, and sand, and has a pH value ranging from 9.0 to 10.5 in the upper part. Buried horizons and a IIC horizon may be present and have a lower

The vegetation consists of greasewood, rabbit- textured. These sloping soils are on alluvial fans along the eastern edge of the survey area at foots

Littlebear sandy loam, 3 to 6 percent slopes (LtC).--This sloping soil occupies alluvial fans along the base of the Sangre de Cristo Range, on the eastern edge of the survey area. Surface runoff is slow. The hazard of soil blowing is severe if vegetative cover is removed.

Along drainageways there are several active gullies that are 10 to 15 feet wide and about 10 feet deep in places. These are normally dry but may have water in them during spring runoff or summer rains.

This soil is used entirely for range. It is grazed by cattle and sheep, and deer and antelope

McGinty Series

The McGinty series consists of well-drained, moderately coarse textured, nearly level soils on flood plains of the valley floor. In places these soils are seeped by irrigation water and have a high water table. They formed in moderately coarse textured, mixed alluvium.

In a representative profile, the surface layer is dark-brown sandy loam that is slightly calcareous, moderately alkaline, and about 6 inches thick. The next layer is dark-brown sandy loam that is slightly

McGinty sandy loam (0 to 1 percent slopes) (Mc).--This soil occurs on low ridges on the lower end of the Rio Grande fan in the vicinity of Mosca and Hooper and on narrow ridges in the southwestern part of the survey area. It has the profile described as representative for the McGinty series. Surface runoff is slow. The hazard of soil blowing is slight to moderate if the vegetation has been removed. The water table commonly is at a depth below 5 feet.

Included in mapping are small areas of soils that have slight salt accumulations in the surface layer. Also included are small areas of Gunbarrel loamy sand and Mosca loamy sand.

This soil is used extensively for irrigated crops. Potatoes, barley, oats, and alfalfa are the main crops. All locally adapted crops do well on this soil if it is irrigated. Some small areas are used for range for cattle and sheep grazing. Capability units IIIs-3 (irrigated) and VIIs-3 (nonirrigated); Salt Flats range site.

McGinty sandy loam, saline (0 to 1 percent slopes) (Mg).--This soil occupies low areas along low ridges, chiefly in the southwestern part of the Alamosa Area. however, water normally is available to plants because the lower part of the root zone is kept moist by the water table. The water table commonly is at a depth of about 30 inches but ranges from a depth of 1 foot in spring to a depth of about 40 inches in the driest part of the year.

The vegetation is sedges, rushes, and water-tolerant grasses. These soils are used chiefly for meadow, but small areas are used for irrigated crops. Some areas are used for range.

Representative profile of Medano fine sandy loam, 1,600 feet south and 1,900 feet east of the northwest corner of sec. 17, T. 40 N., R. 12 E.:

01--3 inches to 0, organic material consisting mostly of decomposed grass, leaves, and roots.
A11--0 to 5 inches, gray (10YR 5/1) fine sandy loam, black (10YR 2/1) when moist; weak, medium, subangular blocky structure parting to moderate, medium, granular; slightly hard when dry, very friable when moist; moderately calcareous; pH 8.0; clear, smooth boundary.
A12--5 to 12 inches, gray (10YR 5/1) sandy loam,

Mosca Series

The Mosca series consists of well-drained alkali soils that have a moderately coarse textured subsoil. These soils are on alluvial floodplains on the val-

C1ca--17 to 26 inches, light-gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) when moist; very weak, medium, subangular blocky structure; hard when dry, very friable when moist; mod-

This soil is used for irrigated crops, pasture, and range. Crops include potatoes, small grains, and alfalfa. The vegetation in range areas is greasewood, rabbitbrush, saltgrass, and alkali sacaton. Capability units IIIew-2 (irrigated) and VIw-2 (nonirrigated); Salt Flats range site.

Mount Home Series

The Mount Home series [redacted]

C2ca--37 to 60 inches, pale-brown (10YR 6/3) very cobbly sandy loam, brown (10YR 5/3) when moist; massive; soft when dry, very friable when moist; highly calcareous in upper part, with lime decreasing with depth; pH 8.2; approximately 85 percent cobblestones, stones, and gravel.

The main variations in this soil are in the amount of cobblestones, stones, and gravel, which [redacted]

loam. These layers are noncalcareous and moderately alkaline and contain many, fine, yellowish-brown mottles.

Nortonville soils have moderately slow permeability and high available water holding capacity. The

crust of salt on the surface in many places. In irrigated meadows there is a thin mat of organic material on the surface. Surface runoff is slow. The hazard of erosion is slight.

Included in mapping are small areas of Vastine

A11--0 to 4 inches, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, thin, platy structure parti

when moist; weak, coarse, subangular blocky structure; hard when dry, friable when moist;

Sandy Alluvial Land

Sandy alluvial land (0 to 1 percent slopes) (Sd)

friable when moist; slightly calcareous; pH 8.1; gradual, smooth boundary.

B21t--7 to 9 inches, brown (10YR 4/3) sandy clay

The texture ranges from loamy fine sand to fine sand throughout the profile. In places there are a few lime-coated pebbles on the surface. The soil commonly is leached of lime to a depth ranging from 15 to 30 inches. The pH value ranges from 7.9 to 8.4 in the A horizon and from 7.9 to 8.4 in the C horizon. The alkali substratum phase has pH values in the lower part of the C horizon ranging from 8.5 to 10.0.

up 40 to 60 percent of the complex. Surface runoff is very slow. The hazard of soil blowing is very severe if the vegetative cover is not maintained.

The vegetation on the Space City soil consists of spiny muhly, blue grama, Indian ricegrass, spike dropseed, rabbitbrush, and some greasewood. The vegetation on Hooper loamy sand is saltgrass, alkali sacaton, and greasewood. Hooper clay loam supports only a few stunted greasewood plants. This complex

B2t--4 to 9 inches, brown (10YR 5/3) very cobbly clay loam, very dark grayish brown (10YR 3/2) when moist; weak to moderate, medium, subangular blocky structure; hard when dry, firm when moist; thin patchy clay films on soil aggregates; noncalcareous; pH 8.0; clear, wavy boundary.

B3--9 to 13 inches, brown (10YR 5/3) very cobbly

Vastine Series

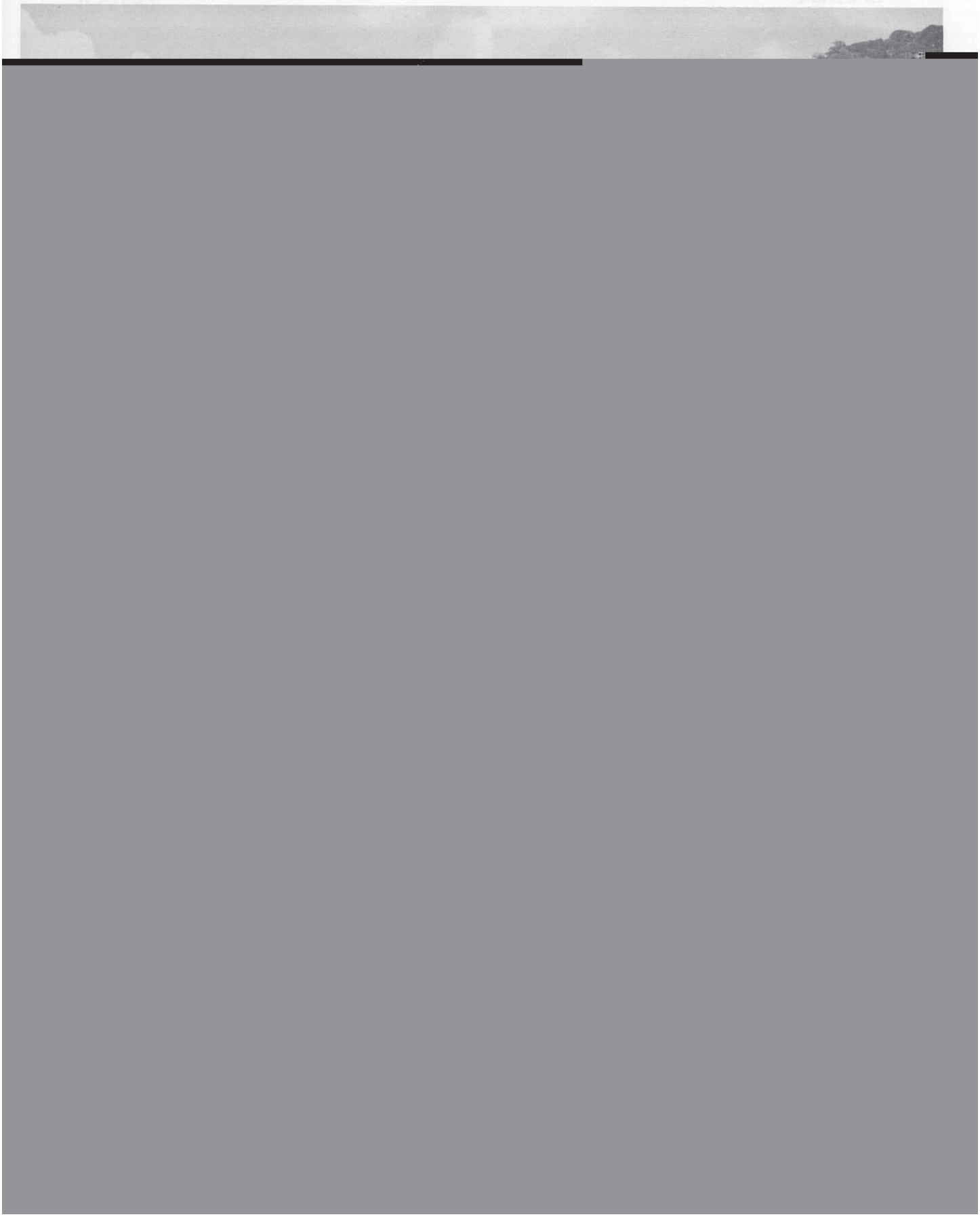
The Vastine series consists of poorly drained, nearly level soils on low bottom lands along major creeks in the southwestern part of the survey area. These soils formed in moderately fine textured, stratified alluvial material and are underlain by sand.

Vastine loam (0 to 1 percent slopes) (Va).--This soil occupies low bottom lands along the Alamosa

moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; hard

in winter. Surface runoff is slow. The hazard of erosion is slight.

PLATE I



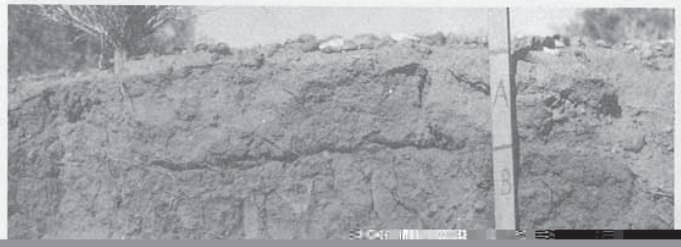
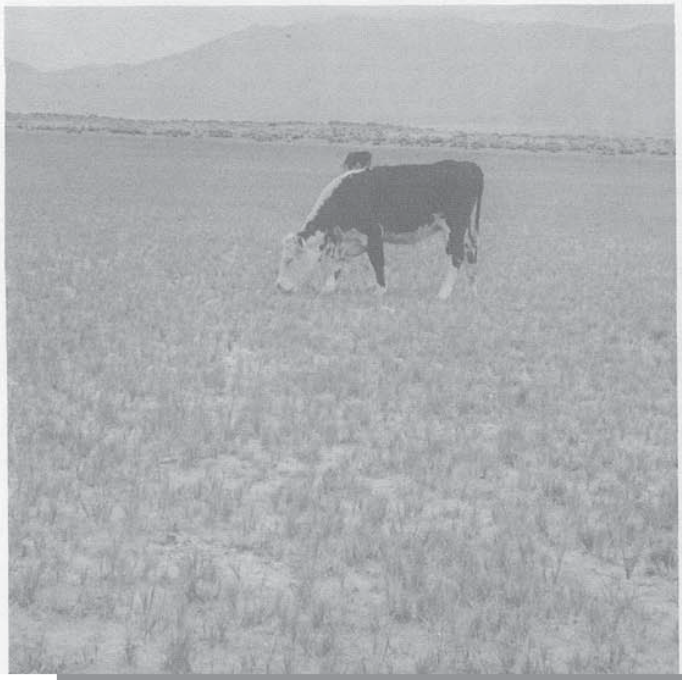

A
B

PLATE III



The A horizon ranges from loam to sandy clay loam in texture. The C horizon ranges from heavy sandy loam to light clay loam and sandy clay loam. This horizon may contain thin layers of light sandy loam. The pH value ranges from 7.9 to 8.4 The lime zone contains about 15 to 25 percent calcium carbonate, and some gypsum normally is present. Depth to sand ranges from 40 to more than 60 inches.

Zinzer loam, 0 to 1 percent slopes (ZnA).--This nearly level soil occupies flood plains in the southwestern part of the survey area. These flood plains are slightly higher in elevation than the surrounding landscape. This soil is nonsaline to slightly saline. It has the profile described as representative for the Zinzer series. Salinity is not strong enough to affect crops that are normally grown in the survey area. Surface runoff is slow. The hazard of soil blowing is slight to moderate in nonirrigated areas if the vegetative cover has been removed.

Included in mapping are small areas of McGinty, Acacio, or Villa Grove soils and isolated small spots of San Arcacio soils.

Where irrigated, this soil is used for most locally adapted crops. It also is used for irrigated pasture. Vegetable crops are grown to a large extent on this soil. Some areas are used for range. Capability units IIIs-1 (irrigated) and VIIs-3 (nonirrigated); Salt Flats range site.

Zinzer loam, saline, 0 to 1 percent slopes (ZoA).--This nearly level to slightly depressed soil occupies flood plains in the southwestern part of Alamosa Area. It is poorly drained and moderately to strongly saline. This soil has a profile similar to the one described as representative for the Zinzer series, except that crops are affected by a fluctuating water table and the salt content. The water table ranges between depths of 2 and 5 feet and is highest during the irrigation season and lowest in winter. The surface commonly is covered by an accumulation of white salt because of the high water table. Surface runoff is slow. The hazard of erosion is slight.

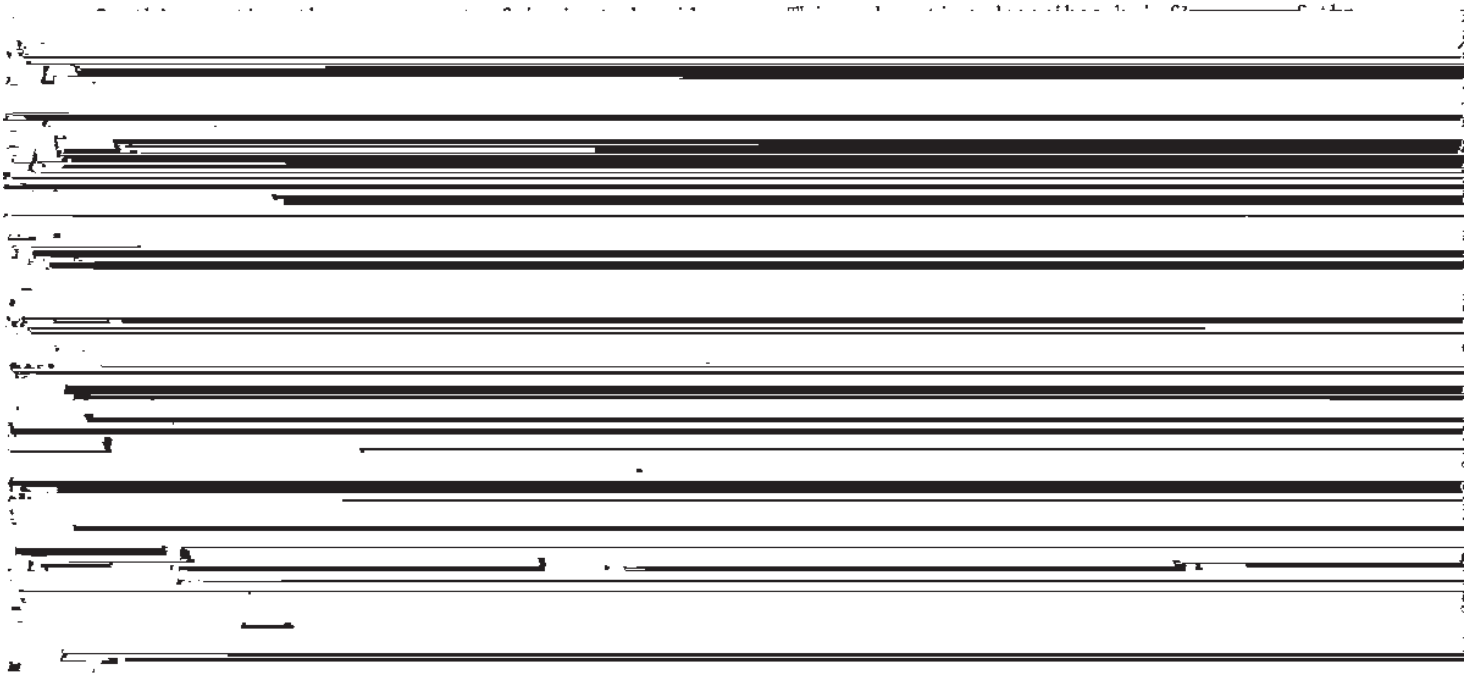
In the less saline areas, this soil is used for all locally grown crops. Salt-tolerant crops should be planted in undrained areas, and water-tolerant grasses and legumes are needed for pasture and hayland plantings. Many areas are used for range. Capability units IIIsw-1 (irrigated) and VIw-2 (nonirrigated); Salt Flats range site.

Zinzer loam, 1 to 3 percent slopes (ZnB).--This gently sloping soil occupies flood plains in the southwestern part of the survey area along the edges of ridges that are slightly higher in elevation than the surrounding area. It generally occurs in long, narrow strips of limited extent. The lower edges of these strips generally are bordered by shallow or moderately deep soils over gravel. Surface runoff is medium. The hazard of erosion is moderate in nonirrigated areas if the vegetation has been removed.

Included in mapping are areas of Acacio or Villa Grove soils that have slopes of 1 to 3 percent. These soils make up as much as 10 percent of any given area mapped as this Zinzer soil. Also included are some very small spots of San Arcacio soils.

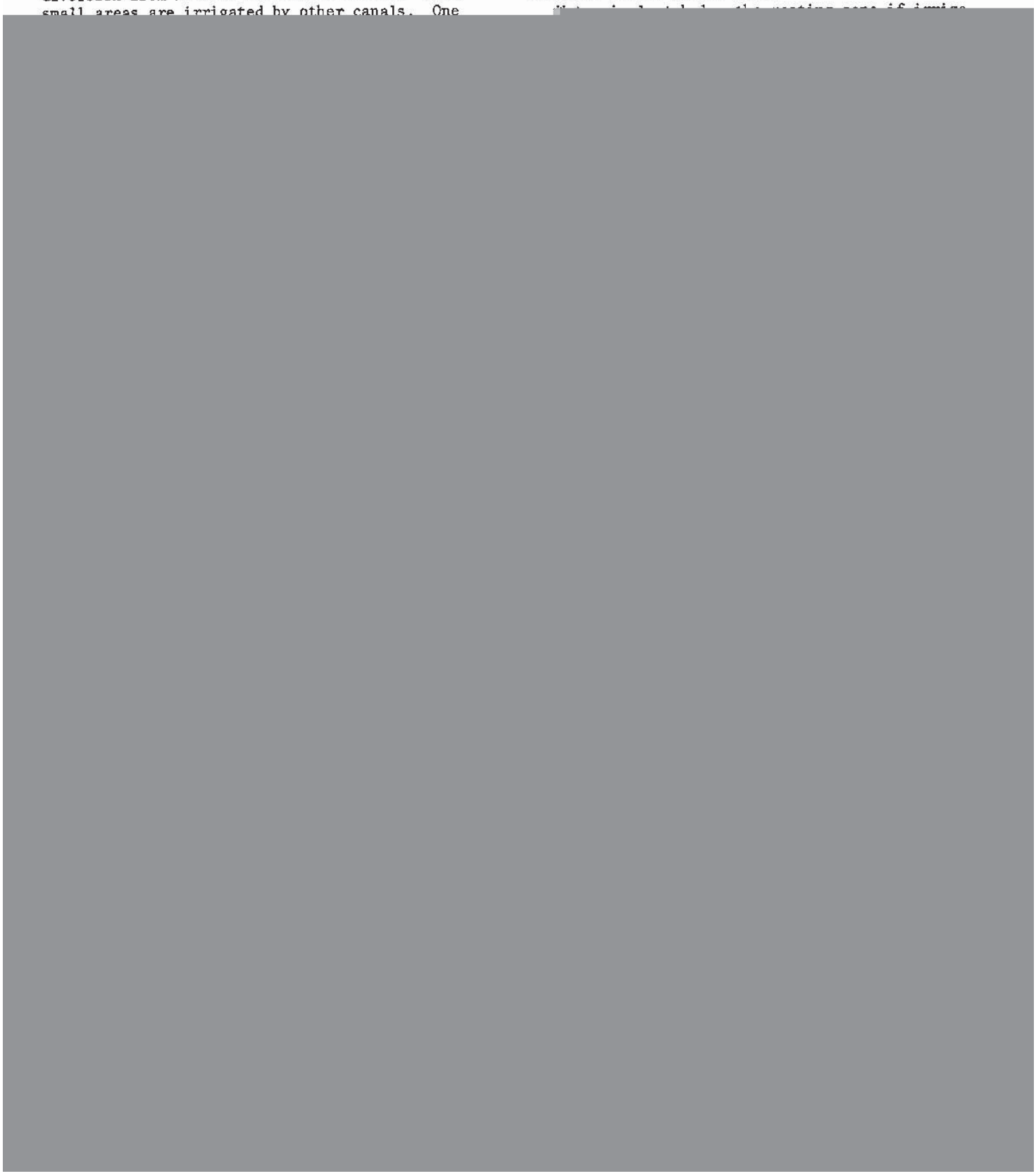
Most of this soil is used for range. Some areas are used for alfalfa, small grains, and pasture. Capability units IIIe-1 (irrigated) and VIIs-3 (nonirrigated); Salt Flats range site.

USE AND MANAGEMENT OF THE SOILS



The Alamosa-Vastine-LaJara soil association is served mainly by the Costilla and Excelsior Canals and by diversion from Alamosa and LaJara Creeks. Some small areas are irrigated by other canals. One

Salinity in a soil decreases the available moisture because plants have a more difficult time drawing moisture from a saline soil.



cabbage, cauliflower, lettuce, potatoes, peas, alfalfa, oats, and sweetclover (13).

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices. (None in Alamosa Area)

Arabic numeral specifically identifies the capability unit within each subclass.

Management by Capability Units

Capability Unit IIIew-1

In this unit are soils of the Villa Grove series. These soils are poorly drained and nearly level to gently sloping. They occur on terraces in the southwestern part of the survey area. The surface layer

each year is desirable to lower the accumulation of salts. The soil must be leveled and kept smooth to provide uniform irrigation and adequate moisture. Legumes respond to phosphorus, and nonlegumes respond to nitrogen and phosphorus. The cropping system should be such that residues can be managed to provide ground cover during windy periods in spring. Emergency listing may be needed if the soil starts to blow.

is slow, and the hazard of erosion is slight to moderate.

These soils are used for crops, permanent pasture, or hay. All locally adapted crops can be grown. The soils are especially well suited to vegetables, small grains, and alfalfa. Good management includes a cropping system with a high-residue crop, a deep-rooted legume in the rotation, and applications of fertilizer for maintaining good tilth and adequate growth of crops. These soils are

usually can be accomplished, and intensive cropping is worthwhile. Such soil [redacted]

This soil is used for all crops adapted to the [redacted]

Natural fertility is low to medium. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used for all adapted crops, although the growth of g[illegible]

Capability Unit IIIsw-5

San Luis sandy loam is the only soil in this unit. This soil is nearly drained and nearly level. It

of irrigation water. Runs can be longer on these soils than on more sandy soils, but the amount of

The surface layer and subsoil are coarse textured, and the subsoil has rapid permeability. The soils

Drainage and leaching are needed. In areas where outlets are available, this soil can be easily [illegible] cannot obtain sufficient water because of salts. The water-intake rate is slow. Surface runoff is [illegible] and the hazard of erosion is slight.

Capability Unit IVw-1

In this unit are soils of the LaJara and Medano series. These soils are poorly drained and nearly

slender wheatgrass, sweetclover, red clover, and alsike clover are suitable. Reed canarygrass and meadow foxtail are especially well suited to the wetter areas and also do well in drier places.

Alkali sacaton, slender wheatgrass, saltgrass, sedges, and rushes are native to this site.

rainfall. The vegetation on these soils consists of spiny muhly, Indian ricegrass, blue grama, low rabbitbrush, Greens rabbitbrush, and pricklypear.

rapid permeability. These soils contain alkali in cobbly and moderately steep. It occurs on alluvial

growth of desirable grasses. Brush control is beneficial in some places where greasewood and rabbit-

of the limited amount of rainfall and the erodibility of the soils, reseeding is not practical unless irrigation water can be used in establishing the

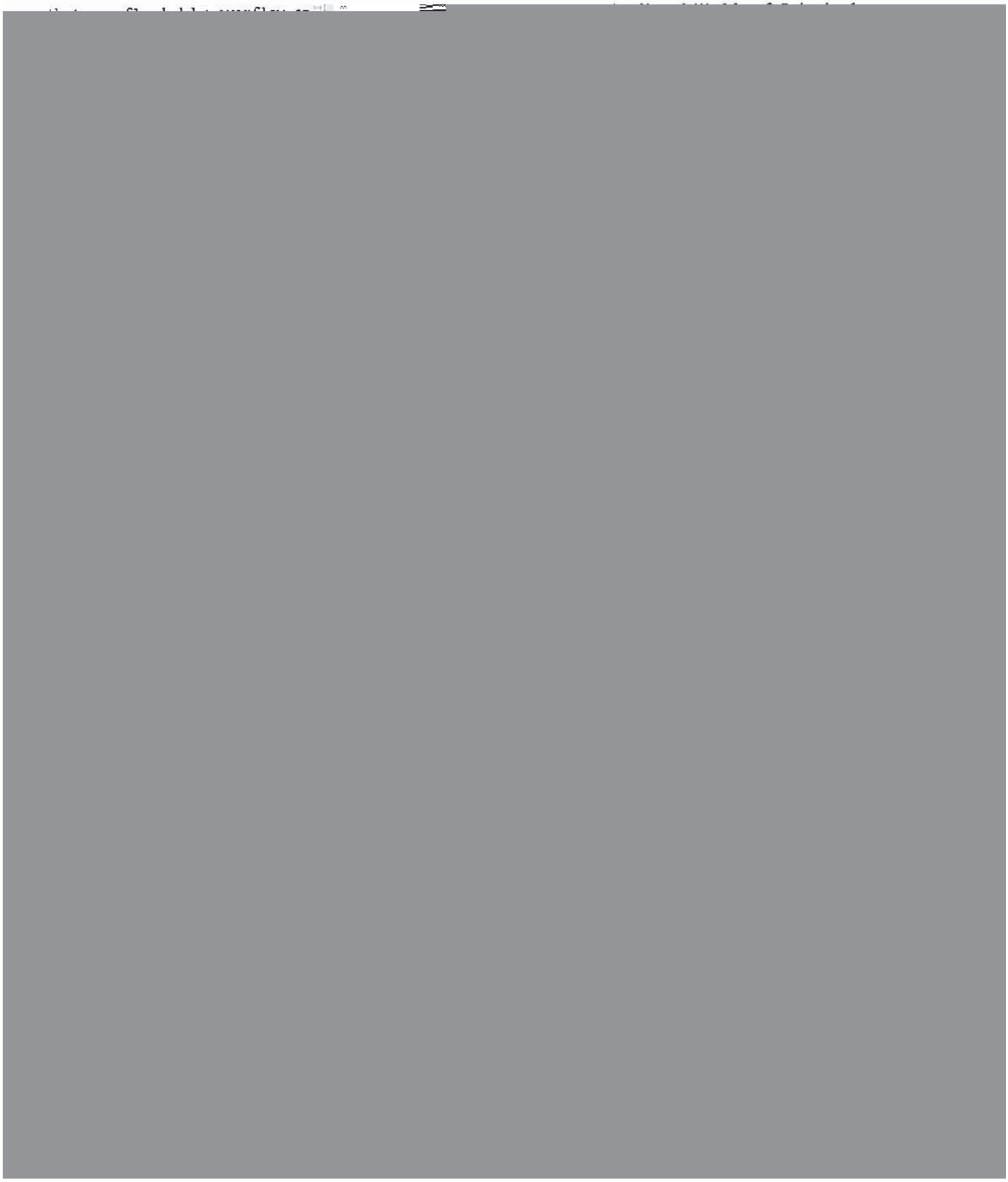


TABLE 2.--PREDICTED YIELDS OF PRINCIPAL IRRIGATED CROPS UNDER TWO LEVELS OF MANAGEMENT

[Yields in columns A are those obtained under common management; yields in columns B are those obtained under high-level management. Dashes indicate that the soil is not suited to the particular crop or that the crop

native plants. Such soils make up more than half of the Alamosa Area. Most of this acreage is better suited to range than to other uses. Native forage plants are thus an important resource, even though production generally is limited by the dry climate (3, 4).

Range and related areas used for grazing in the Alamosa Area occur in three general positions:

1. Soils on the valley floor that are affected to some degree by a water table and excess salts and alkali. On these soils there are sizeable blocks of rangeland and a number of small tracts scattered among irrigated areas. The potential for range use is highly variable. Some soils are capable of high forage production; others have very low value for grazing. Soils that have no consistent potential for producing forage plants (Hooper clay loam, Graypoint-Gravelly land complex, and Sandy alluvial land) are not covered in this section.
2. Broad, well-drained, sandy fans immediately

available moisture holding capacity and fertility of a soil may be altered by erosion or there may be a permanent change in the level of underground water or the occurrence or natural overflow. In such cases a new range site must be recognized.

Distinctions between range sites are recognized by differences in the kinds or proportions of plants that make up the potential plant community or differences in the total production of vegetation if the composition of the potential plant community is essentially the same. To be useful in conservation planning, the differences in the kind or amount of vegetation must be great enough to require some difference in management, such as a different rate of stocking.

Once the range site is known, range condition can be determined by comparing the present vegetation to the potential plant community. This provides an approximate measure of any deterioration that has taken place and, thereby, a basis for predicting the degree of improvement possible.

Decreasers are species in the potential plant community that decrease in relative abundance under

Range practices are mentioned only where they apply specifically to the site under discussion. Practices that apply to range in general are not discussed in this section.

Wet Meadow Range Site

This originally was an important range site, but most of the acreage is now used for irrigated hay meadow. Although much of the site still produces native plants, its potential varies according to the effect of irrigation. The site occupies low areas next to streambeds. Originally, it was most extensive [illegible] soils are dark-colored loams or sandy loams. The main factors that affect plant growth are a high water table, generally within a depth of 3 feet, and a slight to moderate effect from salts and alkali. Natural flooding may occur during times when runoff is normal or higher.

In the climax (potential) plant community, alkali sacaton is the most common decreaser, making up about 50 percent of the vegetation. Other decreasers are alkali cordgrass, slender wheatgrass, and creeping wildrye. Among the other plants are western wheatgrass, saltgrass, and wirerush, which together make up about 20 percent of the stand, and nuttall alkaligrass, sedges, and perennial forbs.

This approximate composition is variable and

under heavy grazing, but the plants become weakened and the stand thinner under these conditions.

The estimated annual yield of air-dry plant material is 900 to 1,500 pounds per acre. About 800 to 1,350 of this provides grazing for cattle.

Sand Hummocks Range Site

This site is made up of low dunes that commonly are intermingled with areas of the Salt Flats range site or with areas of Hooper clay loam. The soils

four-wing saltbush, thickspike wheatgrass, needle-and-thread, and low creeping wildrye, which together make up 50 percent of the stand. Among the other

Sandy Bench Range Site

This site consists of smooth, gently sloping soils between the valley floor and the stony mountain

Under prolonged heavy grazing, blue grama generally increases until it is the main forage plant, and there is a definite increase in rabbitbrush, prickly-

Technical information and assistance in planning for wildlife developments can be obtained through the local office

TABLE 3.--SUITABILITY OF SOIL ASSOCIATIONS FOR WILDLIFE HABITAT

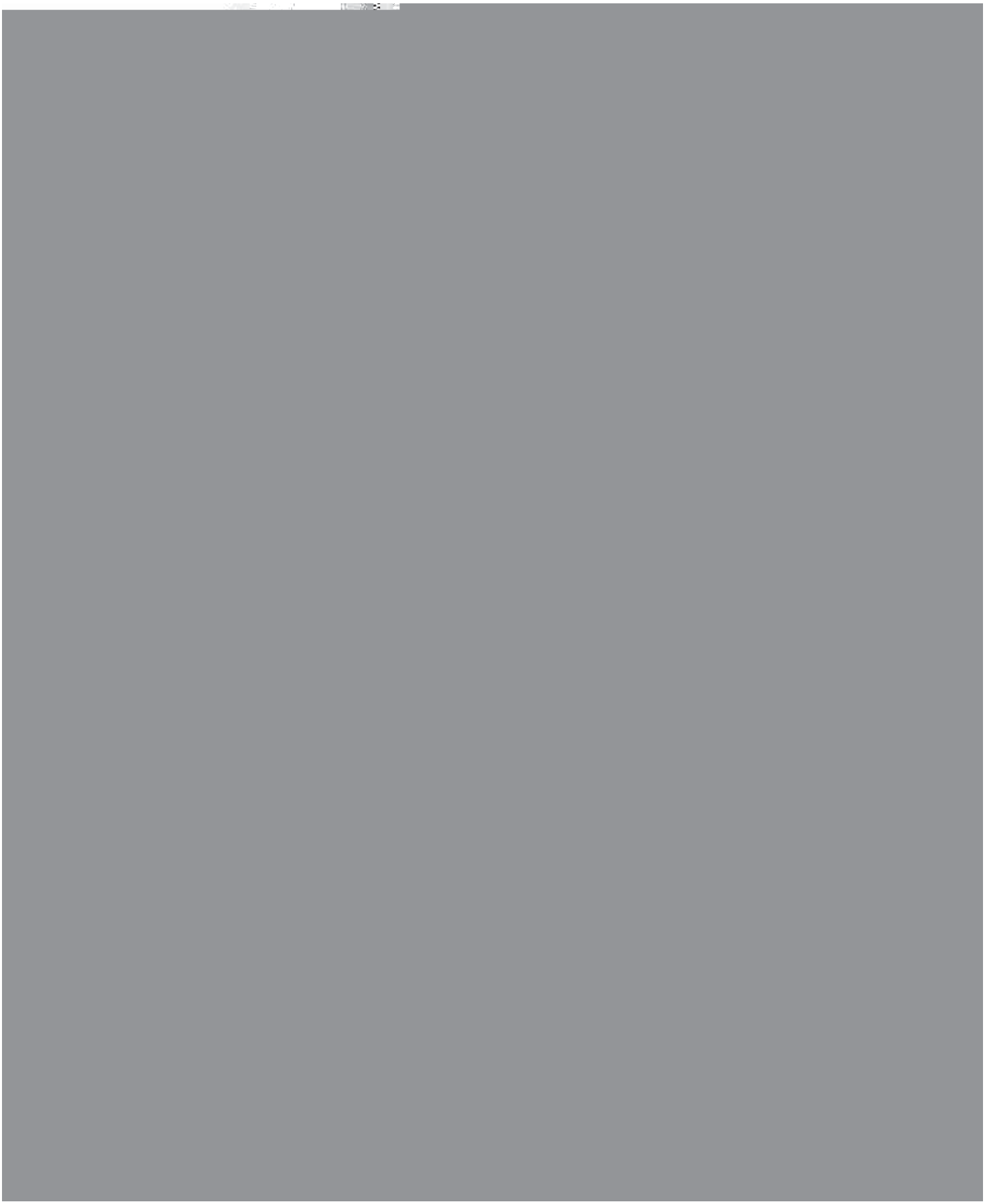
[A rating of 1 denotes highly suited; 2 denotes suited; 3, poorly suited; 4, not suited; and 5, not applicable

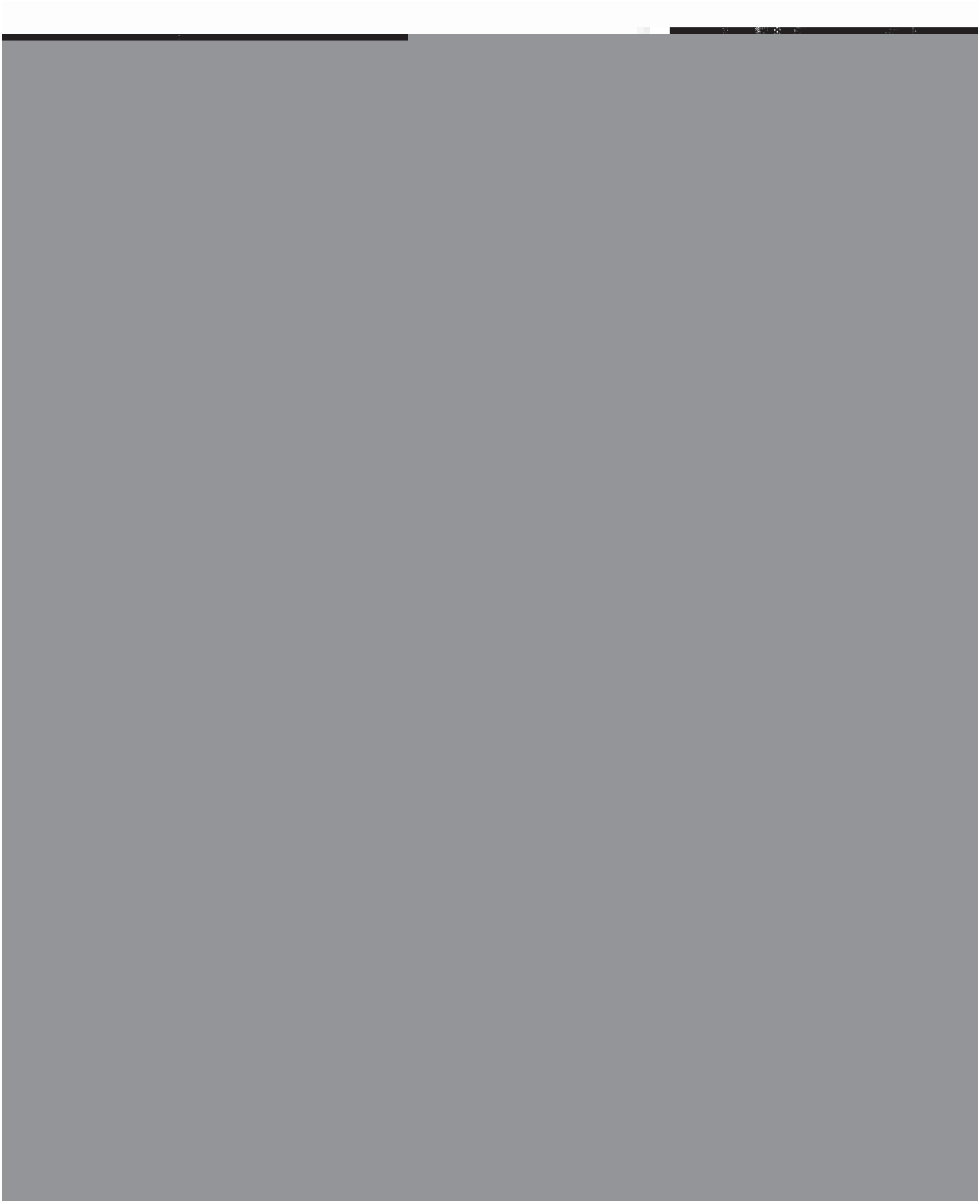
TABLE 3.--SUITABILITY OF SOIL ASSOCIATIONS FOR WILDLIFE HABITAT--Continued

Soil association	Wildlife	Suitability for--			
				Water	
		Food	Cover	Natural streams, lakes, and ponds	Developed lakes and ponds
8. Hapney-Hooper-Corlett.	Mule deer	3	2	1	2
	Jackrabbit	1	1	5	5
	Cottontail	1	1	5	5
	Pheasant	3	2	1	2
	Mourning dove	2	5	1	2
	Waterfowl	2	1	1	2
	Fish	5	5	1	2

TABLE 4.--SOIL INTERPRETATIONS FOR RECREATION--Continued

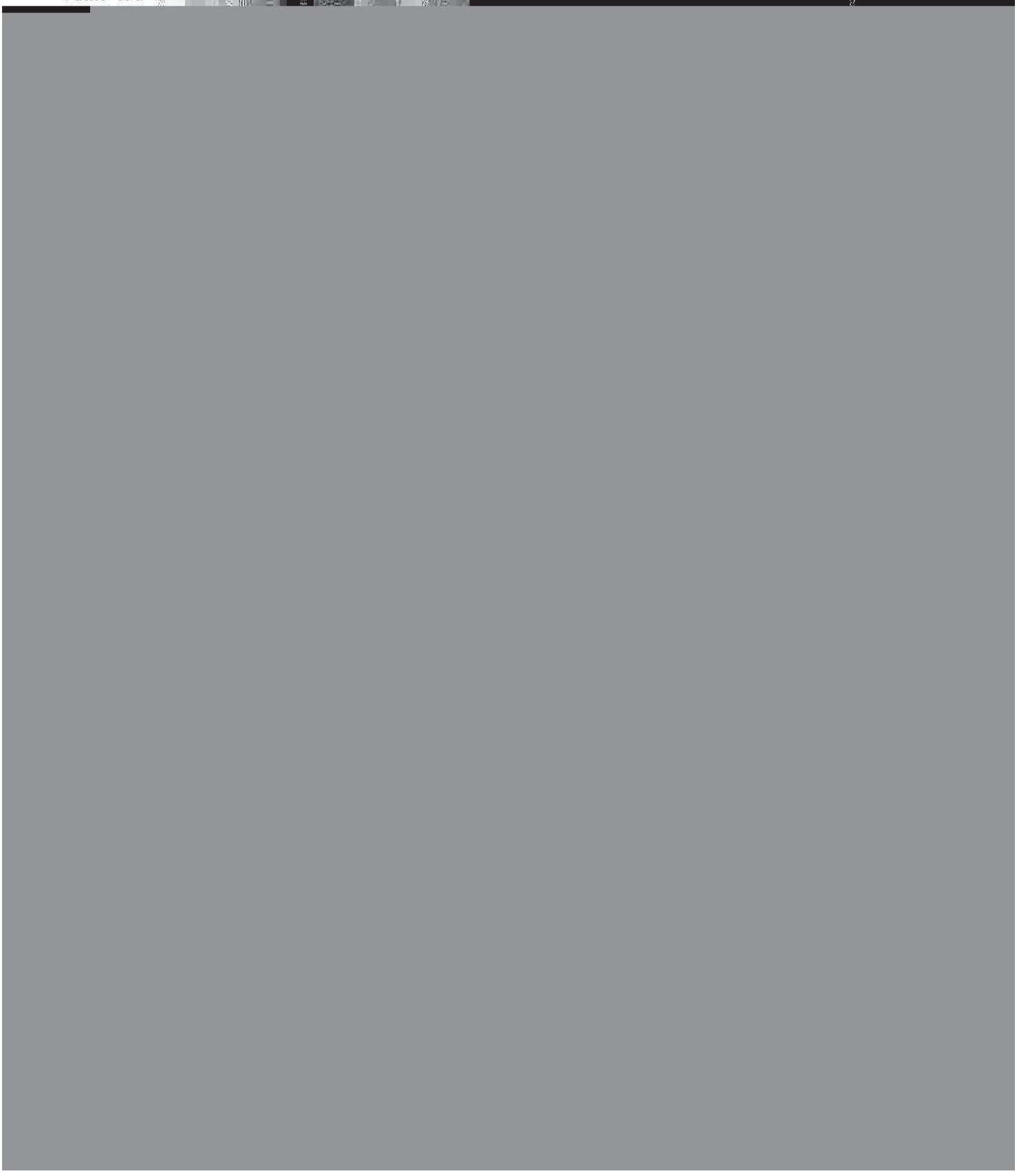
Soil	Degree and kind of limitations for--			





Paths and trails are used for local and cross-

Tables 5, 6, and 7 show, respectively, several



numbers in parentheses, is shown in table 7; the

Hydrologic [redacted]

means soil properties generally favorable for the rates used, or in other words, limitations that are minor and easily overcome. Moderate means soil properties are unfavorable but can be overcome or modified by special planning and design. Severe means soil properties so unfavorable and so difficult to correct or overcome as to require major soil reclamation and special designs.

plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

In estimating the soil features that affect selection of highway location, evaluation is for the profile of an undisturbed soil that has not been drained but has had its organic surface layer removed, if one occurs. Some of the features considered are

TABLE 5.--ESTIMATED SOIL

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or reason it is necessary to follow carefully the instructions for referring to other series that appear in

Soil series and map symbols	Depth to seasonal high water table 1/	Depth from surface	Classification		
			Dominant USDA texture	Unified	AASHO
	Feet	Inches			
Acacio:					
AaA, AaB----------	(3/)	0-4	Sandy loam----------	SM	A-4
		4-16	Clay loam to loam----------	CL or SC	A-6
		16-44	Gypsiferous loam----------	ML	A-4
		44-60	Clay loam----------	CL	A-6
AcA----------	2½-3½	0-4	Sandy loam----------	SM	A-4
		4-16	Clay loam to loam----------	CL or SC	A-6
		16-44	Gypsiferous loam----------	ML	A-4
		44-60	Clay loam----------	CL	A-6

more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this the first column in this table. > means more than; < means less than]

Percentage passing sieve 2/--			Permeability	Available water-holding capacity	Reaction 1:5 dilution	Salinity	Shrink-swell potential	Hydrologic group
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Inches per hour	Inches per in. of soil	pH	Millimhos per cm. at 25°C.		
95-100	85-100	35-45	2.0-6.0	0.11-0.13	8.5-9.0	0-4	Low.	B
95-100	95-100	45-65	0.6-2.0	0.12-0.21	7.9-9.0	0-15	Moderate.	
100	100	55-65	0.6-2.0	0.08-0.16	7.4-8.4	4-15	Low.	
100	100	80-90	0.20-0.6	0.19-0.21	7.9-8.4	2-8	Moderate.	
95-100	85-100	35-45	2.0-6.0	0.08-0.11	8.5-9.0	8-30	Low.	C
95-100	95-100	45-65	0.6-2.0	0.12-0.21	7.9-9.0	8-15	Moderate.	
100	100	55-65	0.6-2.0	0.08-0.16	7.4-8.4	8-15	Low.	
100	100	80-90	0.20-0.6	0.19-0.21	7.9-8.4	4-8	Moderate.	
100	100	60-75	0.6-2.0	0.16-0.18	7.9-9.0	0-4	Moderate.	C
100	100	70-85	0.20-0.6	0.19-0.21	7.9-9.0	0-4	Moderate.	
100	100	5-10	> 10.0	0.04-0.06	7.4-8.4	0-4	Low.	
100	100	60-75	0.6-2.0	0.12-0.14	7.9-9.0	8-15	Moderate.	C

TABLE 5.--ESTIMATED SOIL PROPERTIES

Soil series and map symbols	Depth to seasonal high water table 1/	Depth from surface	Classification		
			Dominant USDA texture	Unified	AASHO
	Feet	Inches			
Graypoint: GgA----------	(3/)	0-4	Gravelly sandy loam--------	SM	A-2
Properties are for		4-12	Sandy clay loam----------	SC	A-4 or A-2

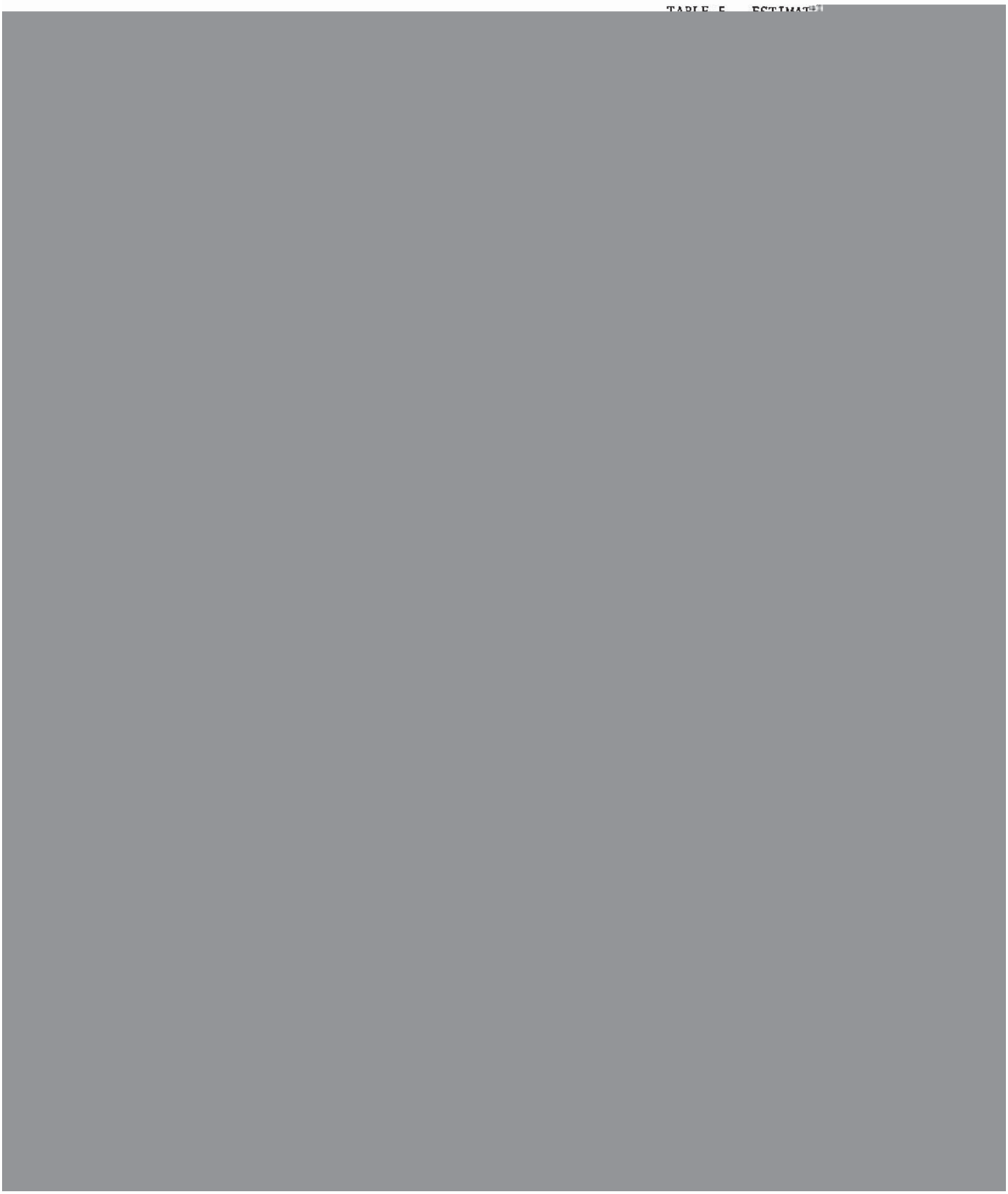
SIGNIFICANT TO ENGINEERING--Continued

Percentage passing sieve 2/--			Permeability	Available water-holding capacity	Reaction 1:5 dilution	Salinity	Shrink-swell potential	Hydrologic group
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hour	Inches per in. of soil	pH	Millimhos per cm. at 25° C.		

TABLE 5.--ESTIMATED SOIL PROPERTIES

Soil series and [illegible]	Depth to seasonal [illegible]	Depth from [illegible]	Classification		
			[illegible]		[illegible]

SIGNIFICANT TO [redacted]



SIGNIFICANT TO ENGINEERING--Continued

Percentage passing sieve 2/--			Permeability	Available water-holding capacity	Reaction 1:5 dilution	Salinity	Shrink-swell potential	Hydrologic group
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Inches per hour	Inches per in. of soil	pH	Millimhos per cm. at 25° C.		
85-95	85-95	25-45	2.0-6.0	0.11-0.13	7.9-8.4	0-4	Low.	B
90-95	85-95	35-50	0.6-2.0	0.14-0.16	7.4-8.4	0-2	Moderate.	
25-50	20-40	0-10	>10.0	0.04-0.06	7.4-9.0	0-4	Low.	
85-95	85-95	25-45	2.0-6.0	0.08-0.11	7.9-8.4	8-30	Low.	B
90-95	85-95	35-50	0.6-2.0	0.11-0.14	7.4-8.4	8-30	Moderate.	
25-50	20-40	0-10	>10.0	0.04-0.06	7.4-9.0	0-4	Low.	
75-90	65-75	20-35	2.0-6.0	0.07-0.09	7.4-8.4	0-2	Low.	A
25-75	25-75	0-10	>10.0	0.03-0.05	7.4-8.4	0-2	Low.	
100	100	30-45	2.0-6.0	0.08-0.10	8.5-10.0	8-30	Low.	C
100	100	35-80	0.20-0.6	0.13-0.16	8.5-10.0	8-30	Moderate.	
100	90-100	5-20	>5.0	0.04-0.06	8.5-10.0	0-4	Low.	
100	100	30-45	2.0-6.0	0.11-0.13	7.9-8.4	0-4	Low.	B
100	100	35-80	0.20-0.6	0.16-0.18	8.5-10.0	0-8	Moderate.	
100	90-100	5-20	>5.0	0.04-0.06	8.5-10.0	0-4	Low.	
100	100	30-45	2.0-6.0	0.11-0.13	7.9-8.4	0-4	Low.	C
100	100	35-80	0.20-0.6	0.16-0.18	8.5-10.0	0-8	Moderate.	
100	90-100	5-20	>5.0	0.04-0.06	8.5-10.0	0-4	Low.	
100	95-100	15-25	6.0-20.0	0.09-0.11	7.9-8.4	0-2	Low.	A
100	95-100	15-25	6.0-20.0	0.09-0.11	7.9-8.4	0-2	Low.	A
100	95-100	15-25	6.0-20.0	0.07-0.10	8.5-10.0	4-8	Low.	
75-90	70-80	50-60	0.6-2.0	0.06-0.08	7.9-8.4	0-2	Low.	B
40-50	35-45	10-20	6.0-20.0	0.03-0.05	7.9-8.4	0-2	Low.	
5-15	5-10	0-5	>20.0	0.03-0.05	7.9-8.4	0-2	Low.	

TABLE 5.--ESTIMATED SOIL PROPERTIES

Soil series and map symbols	Depth to seasonal high water	Depth from	Classification		
			Dominant USDA texture	Unified	AASHO

SIGNIFICANT IN ENGINEERING--Continued

Percentage passing sieve 2/						

TABLE 6.--ESTIMATED

more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this
to other series that appear in the first column in this table]

TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitation for--	
					Septic tank	Homesites

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--						Soil corrosivity	
Highway location	Dikes and diversions	Farm ponds		Agricultural drainage	Irrigation	Untreated steel pipe	Concrete conduits
		Reservoir area	Embankment				
Very steep slopes; shallow soil.	Very steep slopes.	Very steep slopes; shallow over bedrock.	Very stony; shallow soils.	Not needed----	Very steep; stony soil; unsuitable for cultivation.	Low-------	Low.
Erodible slopes; fair sta-	Erodible slopes; rapid perme-	Rapid permeability.	Erodible slopes; rapid per-	Rapid permeability; dune topog-	Low available water holding capac-	Low to moderate.	Moderate.

TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitations for--	
	Topsoil	Sand	Gravel	Road fill	Septic tank	

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--	Soil corrosivity

TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitation for--	
	Topsoil	Sand	Gravel	Road fill	Septic tank filter fields	Homesites

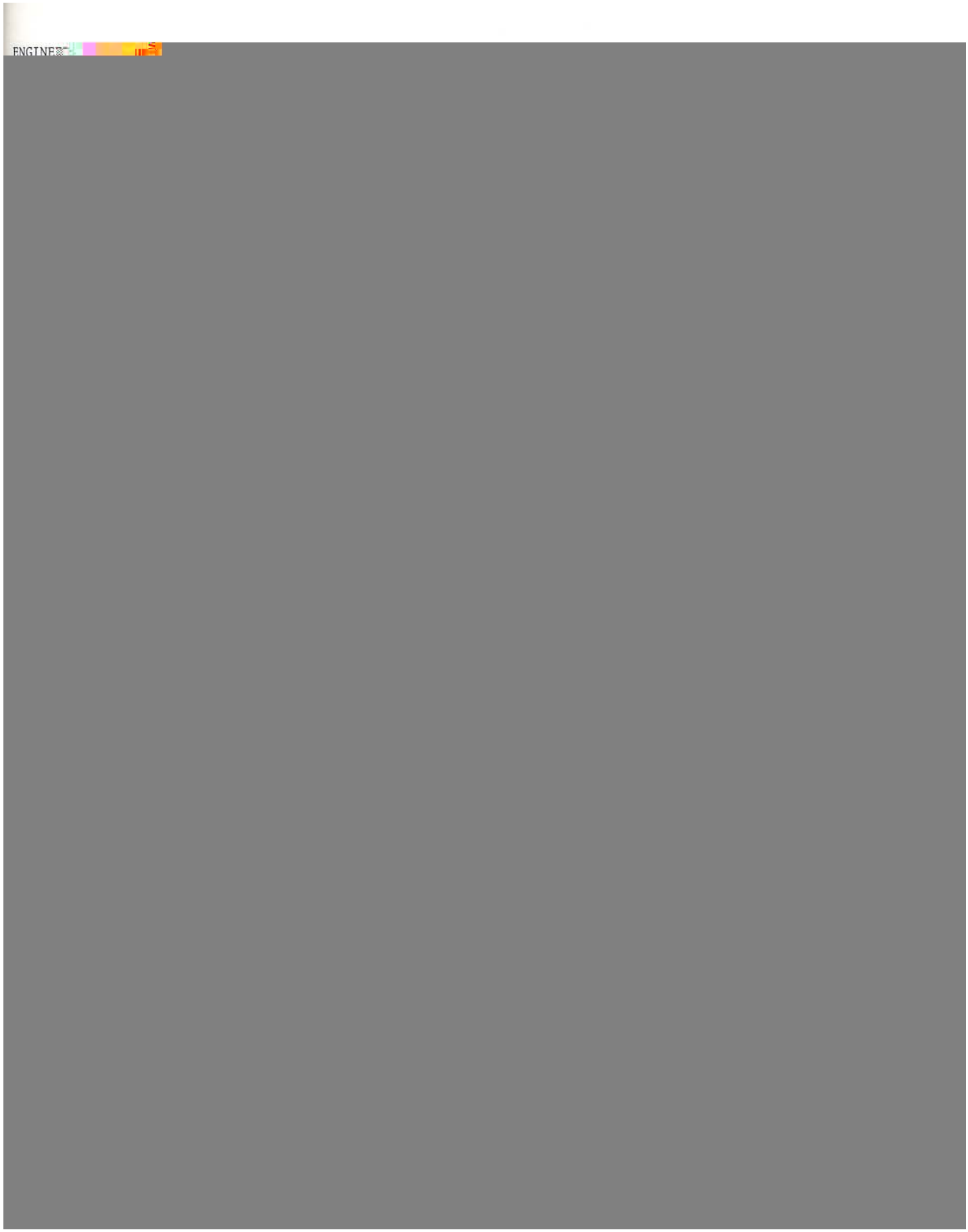

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TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitation for--	
	Topsoil	Sand	Gravel	Road fill	Septic tank filter fields	Homesites
Loamy alluvial land: Lu--	Fair to poor: slight to moderate salinity.	Fair below a depth of 36 inches with washing and screening.	Unsuitable: less than 10 percent gravel.	Fair to a depth of 36 inches: A-6. Good at a depth below 36 inches: A-2.	Severe: water table at a depth of 1½ to 3 feet in places.	Severe: high water table in places.
Marsh: Ma. Too variable to be rated.						
McGinty: Mc	Good	Poor: 30 to	Unsuitable:	Good:	Slight	Slight

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--						Soil corrosivity	
Highway location	Dikes and diversions	Farm ponds		Agricultural drainage	Irrigation	Untreated steel pipe	Concrete conduits
		Reservoir area	Embankment				
Low bottom	Moderate to	Moderate to	Good stabil	Moderately	Well suited	High	Moderate

TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitation for--	
	Topsoil	Sand	Gravel	Road fill	Septic tank filter fields	Homesites
Mosca: (Continued) Ms----------	Poor: texture; salinity and alkali.	Good to fair below a depth of 36 inches with washing and screening 5 to 15 percent fines.	Unsuitable: less than 10 percent gravel.	Good: A-2 or A-3.	Severe: water table at a depth of 2 to 3 feet.	Severe: water table at a depth of 2 to 3 feet.
*Mount Home: MtD-------- For Saguache soils in this mapping unit, refer to the Saguache series.	Poor: 75 to 95 percent cobblestones, stones, and gravel.	Poor: 75 to 95 percent cobblestones, stones, and gravel.	Poor: 20 to 30 percent gravel.	Good: A-1.	Slight: moderately rapid permeability.	Moderate; 4 to 12 percent slopes.
Nortonville: No--------	Poor: salts and alkali.	Unsuitable: more than 50 percent fines.	Unsuitable: no gravel.	Fair: A-4 and A-6.	Severe: water table at a depth of 2 to 3	Severe: water table at a depth of 2 to 3 feet.

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--					Soil corrosivity	
Highway	Dikes and	Farm ponds	Agricultural		Untreated	Concrete

TABLE 6.--ESTIMATED

Series and map symbols	Suitability as a source of--				Limitation for--	
	Topsoil	Sand	Gravel	Road fill	Septic tank filter fields	Homesites

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--					Soil corrosivity	
		Farm ponds			Untreated	

TABLE 6.--ESTIMATED

	Suitability as a source of--				Limitation for--	

ENGINEERING INTERPRETATIONS--Continued

Soil features affecting--					Soil corrosivity	
Highway	Dikes and	Farm ponds			Untreated	

TABLE 6.--ESTIMATED

	Suitability as a source of--	Limitation for--

TABLE 7.--ENGINEERING TEST DATA FOR

[Tests performed by Soil Mechanics Laboratory, Soil

Soil name and location	Parent material	Laboratory sample No.	Depth	Mechanical analysis 1/			
				Percentage passing sieve--			
				3/4 inch (19.0 mm.)	3/8 inch (9.5 mm.)	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)
			Inches				
Cotopaxi sand: 400 feet north and 0.3 mile west of the southeast corner of section 36, T. 40 N., R. 12 E.	Eolian sand.	65C-50	8-60	---	---	---	100
Gunbarrel loamy sand: 0.1 mile east and 40 feet south of the north quarter corner of section 35, T. 40 N., R. 9 E.	Sandy alluvium.	65C-51 65C-52	5-13 48-60	--- 4/ 99	100 88	99 81	97 71
Hooper clay loam: 150 feet east and 20 feet south of the west quarter corner of section 31, T. 38 N., R. 9 E.	Clayey alluvium.	65C-59 65C-60	7-12 32-60	--- ---	--- 100	--- 99	100 94
LaJara loam: 550 feet east and 300	Alluvium	65C-40	37-61				

SOIL SAMPLES FROM NINE PROFILES

Conservation Service, Lincoln, Nebraska]

Mechanical analysis 1/--Continued										Liquid limit	Plasticity index	Classification	
Percentage passing sieve--Cont.			Percentage smaller than--										2/

TABLE 7.--ENGINEERING TEST DATA FOR

Soil name and location	Parent material	Laboratory sample No.	Depth	Mechanical analysis 1/			
				Percentage passing sieve--			
				3/4 inch (19.0 mm.)	3/8 inch (9.5 mm.)	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)
Mosca loamy sand:							

SOIL SAMPLES FROM NINE PROFILES

Mechanical analysis 1/--Continued		Liquid limit	Plasticity index	Classification	
Percentage passing sieve--Cont.	Percentage smaller than--			AASHO	2/

Engineering Test Data

Table 7 contains engineering test data for some of the major soil series in the Alamosa Area. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications were determined by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material, as has been explained for

The ~~parent material associated with these streams was~~ Moisture moving downward through the soil influ-

reaching a maximum after each shower and decreasing during the intervening dry periods.

Even though microbiologic activity assumes a sporadic pattern, it is sufficiently active to account for the thorough breakdown of the small yearly supply of plant residue returned to the soil in the survey area. Consequently, the well-drained soils are characterized by a low organic-matter content, highly stable forms of residual organic compounds, and distribution patterns in which organic matter is concentrated in the upper few inches of the profile. The maximum amount of organic matter coincides with the greatest concentration of plant roots.

In soils where the water table keeps the soil moist for a longer period of time, microbiologic life proceeds more uniformly throughout the warm seasons. In these areas, vegetation is more luxuriant and greater amounts of plant residue are returned to the soil yearly. Consequently, there is greater accumulation of the products of organic decomposition, and they are distributed throughout a greater depth of soil. Such soils are darker colored to a greater depth than well-drained soils

In some very poorly drained areas where the soil is wet most of the time, microbiologic life is dominantly anaerobic. Under such conditions, decomposition is often incomplete and undecomposed organic matter may accumulate on the soil surface.

plains that are still receiving frequent increments of deposition may have differences between horizons. They are considered young soils because the differences are not genetic but are normal characteristics of the unaltered, stratified parent material.

A distinction must be made between chronologic age of landscapes and the age of a soil as interpreted from the degree of genetic horizon formation. Focal points of normal geologic erosion in many landscapes may have little or no formation of genetic horizons because of the removal of soil as rapidly as it is formed. Chronologically, such areas may be as old as those where the soils have well-formed genetic horizons.

Classification of Soils

Soils are classified so that we may more easily remember their significant characteristics, assemble knowledge about them, see their relationships to one another and to the whole environment, and develop principles that help us to understand their behavior and response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land. The current system of classification (14, 15) defines classes in terms of observable or measurable properties of soils. The properties chosen as a basis for classi-

TABLE 8.--CLASSIFICATION OF SOILS

Series	Family	Subgroup	Order	Great soil group (1938 classification) (17)
Acacio--------	Fine-loamy, mixed, frigid---------	Typic Haplargids-------	Aridisols-----	Gypsosols.
Alamosa-------	Fine-loamy, mixed, noncalcareous, frigid.	Typic Argiaquolls------	Mollisols-----	Chernozem-Humic Gley soils.
Arena---------	Fine-loamy, mixed, frigid---------	Aquentic Durorthids----	Aridisols-----	Regosols.
Comodore------	Loamy-skeletal, mixed------------	Lithic Haploborolls----	Mollisols-----	Lithosols.
Corlett-------	Mixed, frigid--------------------	Typic Torripsamments---	Entisols------	Regosols.
Costilla------	Mixed, frigid--------------------	Typic Torripsamments---	Entisols------	Regosols.
Cotopaxi------	Mixed, frigid--------------------	Typic Torripsamments---	Entisols------	Regosols.
Graypoint-----	Fine-loamy over sand or sandy-skeletal, mixed, frigid.	Typic Haplargids-------	Aridisols-----	Brown soils.
Gunbarrel-----	Mixed, frigid--------------------	Typic Psammaquents-----	Entisols------	Alluvial soils.
Hapney--------	Fine, montmorillonitic-----------	Aridic Natriborolls----	Mollisols-----	Solonetz soils.
Homelake------	Fine-loamy, mixed----------------	Aquic Fluvaquentic Haploborolls.	Mollisols-----	Alluvial soils.
Hooper--------	Clayey over sand or sandy-skeletal, montmorillonitic, frigid.	Typic Natrargids-------	Aridisols-----	Solonetz soils.
LaJara--------	Coarse-loamy, mixed, calcareous, frigid.	Typic Haplaquolls------	Mollisols-----	Regosols.
Laney---------	Fine-loamy, mixed, calcareous, frigid.	Typic Torrifluvents----	Entisols------	Regosols.
LaSauses------	Fine, mixed, nonacid, frigid------	Aeric Halaquepts-------	Inceptisols---	Regosols.
Littlebear----	Sandy, mixed, frigid-------------	Typic Torriorthents----	Entisols------	Alkali Regosols.
McGinty-------	Coarse-loamy, mixed, frigid-------	Typic Calciorthids-----	Aridisols-----	Calcisols.
Medano--------	Sandy, mixed, frigid-------------	Typic Haplaquolls------	Mollisols-----	Alluvial soils.
Mosca---------	Coarse-loamy, mixed, frigid-------	Typic Natrargids-------	Aridisols-----	Brown soils.
Mount Home----	Loamy-skeletal, mixed, calcareous, frigid.	Typic Torriorthents----	Entisols------	Regosols.
Nortonville---	Fine-loamy, mixed, frigid---------	Typic Calciaquolls-----	Mollisols-----	Regosols.
Saguache------	Sandy-skeletal, mixed, frigid-----	Typic Torriorthents----	Entisols------	Regosols.
San Arcacio---	Fine-loamy over sand or sandy-skeletal, mixed, frigid.	Typic Haplargids-------	Aridisols-----	Brown soils.
San Luis------	Fine-loamy over sand or sandy-skeletal, mixed, frigid.	Aquic Natrargids-------	Aridisols-----	Brown soils.
Space City----	Mixed, frigid--------------------	Typic Torripsamments---	Entisols------	Regosols.
Uracca--------	Loamy-skeletal, mixed------------	Aridic Argiborolls-----	Mollisols-----	Chestnut soils.
Vastine-------	Fine-loamy over sand or sandy-skeletal, mixed, noncalcareous, frigid.	Typic Haplaquolls------	Mollisols-----	Alluvial soils.
Villa Grove---	Fine-loamy, mixed----------------	Aridic Argiborolls-----	Mollisols-----	Brown soils.
Zinzer--------	Fine-loamy, mixed----------------	Aridic Calciborolls----	Mollisols-----	Regosols.

or oxic horizon unless it is a buried horizon. They do not have a calcic or gypsic horizon within a depth of 40 inches. In the Alamosa Area, this order includes soils formerly classified as poorly drained Alluvial soils or Regosols.

Aridisols are soils of dry areas. They have a light-colored surface layer and a zone of translocated carbonates in a subsoil horizon. They may or may not have an argillic, calcic, gypsic, natric, or cambic horizon or a duripan. In the Alamosa Area, this order includes some of the soils that were formerly classified as Brown soils, Calcisols, Gypsosols, and Solonetz soils.

Mollisols are soils that have a thick, dark-colored surface layer. They may have an albic, cambic, argillic, or natric horizon; a duripan; or a ca, cs, or sa horizon. The climate of the Mollisols ranges from semi-arid to humid. The Mollisols in the Alamosa Area include some of the soils that formerly were classified as Chernozems, Chestnut soils, Humic Gley soils, Lithosols, and Solonetz soils. Some soils formerly classified as Regosols and Alluvial soils are now placed in the Mollisols.

SUBORDER: Each order has been subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either soil differences that result from climate or vegetation or the presence or absence of waterlogging or differences in parent material. The names of the suborders have two syllables. The last syllable indicates the order. An example is Psamments

In soils without a B horizon, it is applied to an arbitrary depth between about 10 and 40 inches, or to bedrock, whichever is shallower. The texture of the soils in the Alamosa Area ranges from fine to sandy-skeletal.

Mineralogy refers to the type of material in which the soil formed. Most of the soils are of mixed mineralogy, although some are siliceous (quartz sand) and some are montmorillonitic (dominated by montmorillonite clay) soils.

Reaction identifies a soil as being acid, nonacid, calcareous, or noncalcareous.

TABLE 9.--SOIL TEMPERATURES OF SELECTED SERIES AT A DEPTH OF 20 INCHES

surface, are very strongly alkaline, and have an exchangeable sodium percentage exceeding 15 throughout most of the soil.

Typic Torriorthents.--The soils of this subgroup formed under grass vegetation in parent sediments that are either medium textured to moderately coarse textured or, if coarse textured, contain more than 35 percent coarse fragments. Average annual precipitation is approximately 6 inches, with peak periods of precipitation occurring in spring and early in summer. Mean annual soil temperature measured at a depth of 20 inches is about 45°, and the mean summer soil temperature at the same depth is about 66°.

Typically, these soils have an A1sa, B2g horizon sequence. The A horizon is light colored, friable, and granular and contains visible accumulation of soluble salt. The B2g horizon is fine textured, is massive or has weak blocky structure, and is intensely mottled. Base colors, however, are redder in hue and brighter in chroma than the colors of the A horizon.

The LaSauses series is the only member of this subgroup in the Alamosa Area.

Aquentic Durorthids.--The Arena series is the only member of this subgroup in the Alamosa Area. These soils formed under greasewood and sparse grass vegetation on flood plains and low terraces on the

at or near the surface most of the year. Because

a transitional B3cag horizon that has some accumula-

TABLE 10.--PARTICLE-SIZE DISTRIBUTION AND CHEMICAL

[Analytical data for all soils except the Hapney obtained from Soils Laboratory, Soil Conservation Service, Conservation Service, Lincoln, Nebraska. Dashes indicate

Soil name, sample number, and location	Horizon	Depth	Particle-size distribution					
			Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Total sand
		Inches	Percent	Percent	Percent	Percent	Percent	Percent
Acacio loam:								
S63 Colo-2-111; 0.25 mile W. and 36 feet S. of NE. corner of sec. 11, T. 36 N., R. 9 E.	A1	0-4	6.2	12.6	13.3	19.5	14.6	66.2
	B21t	4-7	1.7	8.6	12.8	19.1	13.1	1/ 55.3
	B22tsa	7-10	3.1	10.2	13.4	18.4	12.4	1/ 57.5
	C1	10-16	3.2	8.2	10.6	16.0	12.0	50.0
	C2cs	16-44	---	----	----	----	----	----
	C3	44-60	.9	2.4	3.1	3.9	9.1	19.4
Alamosa loam:								
S63 Colo-2-130; 1,050 feet N. and 1,150 feet E. of S. quarter corner of sec. 21, T. 38 N., R. 10 E.	Ap	0-9	1.9	4.7	3.7	8.9	12.6	31.8
	B21t	9-17	1.1	3.4	2.2	4.6	10.7	22.0
	B22t	17-27	1.5	4.1	2.2	2.5	9.9	20.2
Arena loam:								
S63 Colo-2-118; 1,250 feet E. and 950 feet N. of SW. corner of	A11	0-2	2.0	7.4	7.8	12.3	11.9	41.4
	A12	2-5	1.8	5.6	5.8	9.5	11.9	34.6
	AC	5-13	1.4	5.4	5.7	10.1	13.7	36.3

CHARACTERISTICS OF SELECTED SOILS IN THE ALAMOSA AREA, COLORADO

Colorado State University, Fort Collins, Colorado. Data for Hapney soil obtained from Soils Laboratory, Soil values not determined. The symbol > means greater than]

Particle-size distribution--Cont.		Reaction		Electrical conductivity ECx103	Organic carbon	Calcium carbonate equivalent	Moisture at saturation	Cation exchange capacity	Exchangeable cations		Exchangeable sodium
Silt	Clay	Paste	1:5						Exchangeable sodium	Exchangeable potassium	
Percent	Percent	pH	pH	Millimhos per cm.	Percent	Percent	Percent	Meq./ 100 g.	Meq./ 100 g.	Meq./ 100 g.	Percent
22.7	11.1	7.6	8.6	2.0	1.1	0.8	25.4	10.0	---	---	---
18.1	26.6	8.0	8.8	4.5	.9	3.3	39.1	16.0	---	---	---
18.8	23.7	7.9	8.4	10.0	1.0	8.0	39.0	13.7	---	---	---
22.8	27.2	8.0	8.4	12.0	1.1	16.3	43.1	13.7	---	---	---
----	----	7.9	8.0	8.5	.2	1.9	52.3	10.3	---	---	---
44.7	35.9	7.8	8.0	6.0	.2	10.6	55.2	23.0	---	---	---

TABLE 10.--PARTICLE-SIZE DISTRIBUTION AND CHEMICAL CHARACTERISTICS

Soil name, sample number, and location	Horizon	Depth	Particle-size distribution					
			Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Total sand
		Inches	Percent	Percent	Percent	Percent	Percent	Percent
Gunbarrel loamy sand:								
MH 48-51; 8160-8163; 500	Ap	0-6	---	---	---	---	---	83.0
feet S. and 320 feet	C1	6-27	---	---	---	---	---	84.0
W. of NE. corner of	C2	27-45	---	---	---	---	---	87.0
sec. 16, T. 39 N., R. 10 E.	IIC3	45-60	---	---	---	---	---	92.0
Hapney loam:								
S64 Colo-2-1; 695 feet	B21t	5-13	---	---	---	---	---	----
W. and 75 feet S. of	B22t	13-23	---	---	---	---	---	----
NE. corner of sec. 27, T. 38 N., R. 11 E.								
Hooper loamy sand:								
S63 Colo-2-120; 150 feet	A22	4-7	5.2	11.7	10.6	18.3	12.2	58.0
E. and 20 feet S. of S.	B2t	7-12	2.1	6.5	7.3	14.0	11.4	41.3
quarter corner of sec.	B3	12-16	4.4	8.2	8.7	17.5	15.7	54.5
31, T. 38 N., R. 9 E.	C1ca	16-32	2.4	9.7	13.3	23.9	20.6	69.9
	IIC2	32-60	11.2	17.9	19.5	26.8	16.3	91.7
LaJara loam:								
S63 Colo-2-135; 1,200	A1	0-10	.4	1.2	2.3	10.1	16.3	30.3
feet E. and 300 feet	B21g	10-25	.1	.4	1.0	8.9	32.7	43.1
N. of SW. corner of	B22g	25-50	0	.4	1.3	21.3	30.0	53.0

OF SELECTED SOILS IN THE ALAMOSA AREA, COLORADO--Continued

Particle-size distribution--Cont.	Reaction	Electrical		Calcium	Moisture	Cation	Exchangeable cations		Exchange-

TABLE 10.--PARTICLE-SIZE DISTRIBUTION AND CHEMICAL CHARACTERISTICS

OF SELECTED SOILS IN THE ALAMOSA AREA, COLORADO--Continued

Morphologically, these soils are characterized

extracted by the ammonium acetate method, minus the

Gunbarrel, Littlebear, and Space City soils. The Corlett and Space City soils are less than 5 percent clay. Some of the soils have a clay increase in the B horizon that indicates clay movement from the A horizon to the B horizon. These soils are the Alamosa, Acacio, San Arcacio, Graypoint, Hooper, and San Luis soils. Some soils contain more clay in certain horizons than in others as a result of stratification. Costilla and Space City soils have a low percentage

percentage in the substratum. The sand substratum in soils that have a fluctuating water table, such as the Hooper soil, commonly has a lower electrical conductivity than the surface layer and subsoil. Soils that have high electrical conductivity and a high percentage of soluble salts are the Arena, Acacio, Laney, LaSauses, and Nortonville soils. The

Ranching development and mining activities in the mountains to the west encouraged the Denver and Rio Grande Western Railroad to extend a line westward over the Sangre de Cristo Range. In 1878, this line

that enter the basin from the west are much larger and have extensive drainage basins in the San Juan Mountains. They have formed much broader and more gently sloping alluvial fans. The Rio Grande allu-

Except for a small area of granitic rocks of Precambrian age that crop out along the slopes of Sierra Blanca, the geologic formations exposed within the Alamosa Area consist of unconsolidated sedi- fine to coarse sand. They were probably derived mostly from Precambrian rocks in the Sangre de Cristo Mountains.

TABLE 11.--TEMPERATURE AND PRECIPITATION, ALAMOSA AREA, COLORADO

[All data from Alamosa, Alamosa County; elevation 7,539 feet]

	Temperature	Precipitation

winter or fall, except when it precedes a storm front. Spring and summer wind does the most damage by drying out the soil and making it necessary to irrigate more frequently.

Snowfall averages about 30 inches per year. It normally comes as light snow between November and April. During winter it normally stays on the ground for several weeks at a time. Some snow that falls early in fall or late in spring melts within a few days.

Farming

Irrigated farming and ranching are the principal activities in the survey area. The number of farms and ranches has been declining in the last 25 years, and the size has been increasing. There are at present about 315 operating units, and these have an average size of 1,364 acres. Most farms are from 160 to 480 acres in size. A few large ranches occupy several thousand acres.

The main crops and the approximate acreage on which they are grown yearly are alfalfa, 30,000 acres; potatoes, 7,000 acres; barley, 10,000 acres; oats, 7,000 acres; and meadow hay, 30,000 acres. Sugar beets, lettuce, cabbage, cauliflower, and peas are among the crops grown to a lesser extent. Their total acreage is about 2,000 acres.

Ranching consists mainly of raising cattle and sheep. Many of these units are operated in conjunction with irrigated farming. Some horses are raised. Hogs are raised on some irrigated farms.

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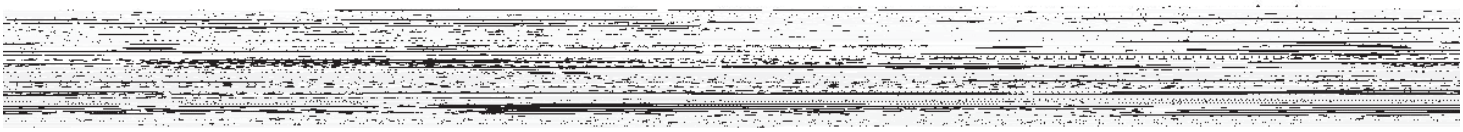

Profile, soil. A vertical section of the soil

Solum. The upper part of a soil profile, above the

GUIDE TO MAPPING UNITS

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit				Range	
			Irrigated		Nonirrigated			
			Symbol	Page	Symbol	Page	Name	Page
SlB	San Luis-Corlett complex, undulating	32						